Institute of Technology, Sligo

Stanley – Computer Controlled RC Car

User Manual

Marina Andricic
S00052864

BSc in Web Development
Year: 2007/2008

Supervisor: Paul Powell

TABLE OF CONTENTS

STANLEY – COMPUTER CONTROLLED RC CAR 0

TABLE OF CONTENTS 1

APPLICATION OVERVIEW 2

HARDWARE 2

REQUIREMENTS: 2
Must have 2
Not essential: 3

CONNECTING THE CAR 3

REQUIREMENTS: 3
CONNECTING THE CAR 3

CONNECTING THE CAMERA 6

REQUIREMENTS: 6
CONNECTING THE CAMERA 6

INSTALATION 7

USING THE APPLICATION 7

START THE APPLICATION 7
CONTROL THE CAR ON THE SCREEN 9
CONTROL THE CAR ON THE SCREEN 9
FOLLOW THE PATH 10
SET THE SPEED 11
DRAW THE PATH 11
CONTROL IN DARK 12
USB Webcam 12
IP Webcam 14
CONTROL IN DARK ADVANCE 15
USB Webcam 15
IP Webcam 16
CONTROL THE STANLEY WITH CAMERA 17
SPY IN DARK 19
CAR SPY 19

APPLICATION OVERVIEW

Stanley is RC Car that can be controlled by computer.

It is divided into two parts: with Camera, and without camera.

If Stanley don't have camera, following operations can be performed:

- Control the Stanley by the Keyboard
- Control the Stanley by the mouse
- Control the Stanley by the buttons on the screen
- Draw the path on the screen and Stanley will follow that path

If Stanley have camera, following operations can be performed:

- Give the direction to Stanley by light object (e.g. hand lamp or laser pointer) and Stanley will move in given direction
- Walk with a light object (e.g. hand lamp or laser pointer) and Stanley will follow
- Move the specific object and Stanley will follow.

HARDWARE

Requirements:

Must have

- RC Car – with digital controller

NOTE* Chip RC Cars usually have digital controller that uses switches for controlling left/right/forward/backward movements.

- Computer
- PhidgetInterfaceKit 0/0/4

See "Connecting the Car" for instruction

Not essential:

- USB Webcam
- IP Webcam

If Webcam is power wired it will need to be made into wireless

See “Connecting the Camera” for instruction.

- Hand lamp or Laser pointer

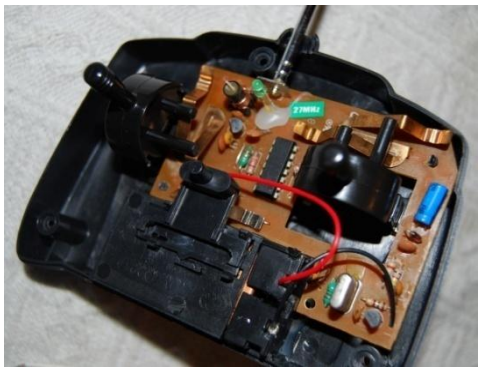
CONNECTING THE CAR

Requirements:

- RC Car
- PhidgetInterfaceKit
- Wires
- Soldering Iron
- Solder

NOTE* If user is a child it will need adult supervision to connect the car

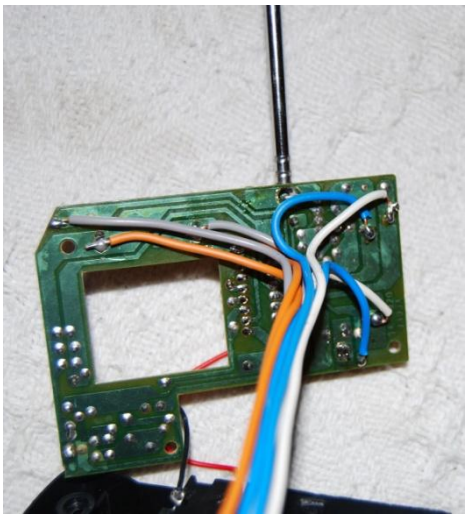
Connecting the Car



1. **Identify the points**

   A Controler uses swithches for controling direction of the car, under each switch are two points (ground and active); by presing the button (forward/left/right/backward) on controler switches on the board are pushed, both points will be tached by the switch, and that closes circuit, which give the direction to the Car

2. **Solder the wires**

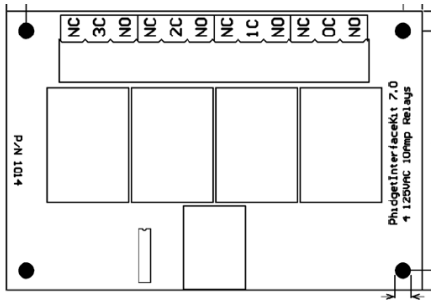


Next step is to solder wires on each of those points.

Each pair of the points shoud have diferent wire colour, one colour for one direction. Remember which colour is for which direction.

Connect wires to the Phidget Interface Kit Board.

Phidget Interface Kit Board have 4 Relay Outputs. Each relay has 3 connections: #C *(# = number from 0-3)* - Common or Ground, NO Normally Open, NC - Normally Closed.



(Graph 1- Phidget Interface Board)

Screw the oposit side of the wires (grouped by the color of the wire) to each Relay on the Phidget Interface, one wires to #C and other to NO.

Directions:

0C and **NO** - For Forward direction.

1C and **NO** - For Back direction.

2C and **NO** - For Left direction.

3C and **NO** - For Right direction.

Test the car by the runing the application . See “Using the application” for mor information on how to start the application

Close the controller and attach the PhidgetInterface board to the controller

CONNECTING THE CAMERA

Requirements:

- 4 AA chargeable batteries at 1.5V each with capacity rating over 2000mAh
- Battery holder
- Power connector that mach the size of camera connector on the AC power supply
- Wires
- Soldering Iron
- Solder

Connecting the Camera

Solder the wires to the power connector

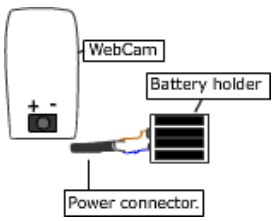
On the camera where power connector is, it is a symbol that shows the positive and negative terminals for the power connector.

By soldering the wires to the power connector, it is important to kip in mind which wire will be used for which terminal.

Connect the other side of the wires to the battery holder

Place the batteries in battery holder

Connect the power connector into Camera



(Image1- Connect the camera)

INSTALATION

1. Download the application to your computer.
2. Extract the MSRS folder into your C:/ drive
3. To start the application
    a. Open the command prompt
    b. Write Line:

cd /d "MSRS\Stanley"

bin\dsshost /p:50000 /m:"Stanley\RemoteCar.manifest.xml"

USING THE APPLICATION

1. Turn on the Car
2. Turn on the Controller
3. Connect the PhidgetInterface USB cable into USB port on your computer.
4. To Start The Application – Write line in command prompt

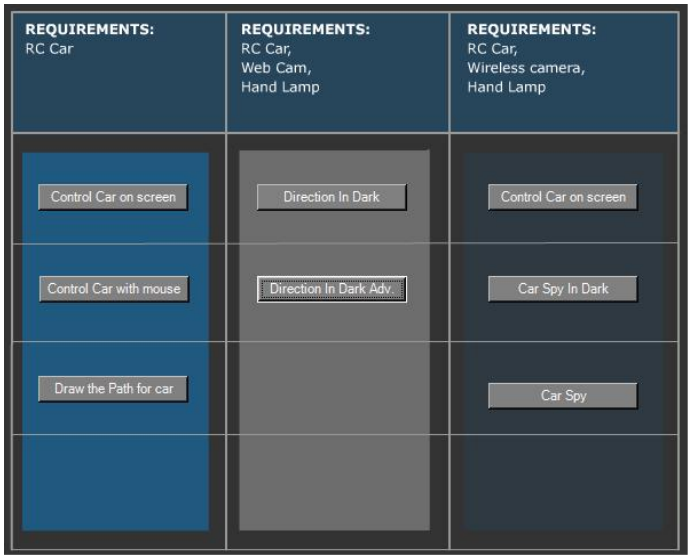
cd /d "MSRS\Stanley"

bin\dsshost /p:50000 /m:"Stanley\RemoteCar.manifest.xml"

Start the application

Requirements

- RC Car
- PhidgetInterfaceKit



1. Use **Keyboard arrow** keys to control the Stanley
    a. Forward arrow = Move Forward
    b. Back arrow = Move Back
    c. Left arrow = Turn the first wills left
    d. Right arrow = Turn the first wills right
    e. Left arrow + Forward arrow = Move Forward-Left
    f. Right arrow + Forward arrow = Move Forward-Right
    g. Left arrow + Back arrow = Move Back-Left
    h. Right arrow + Back arrow = Move Back-Right

Stanley moves in specific direction as long as key is pressed.

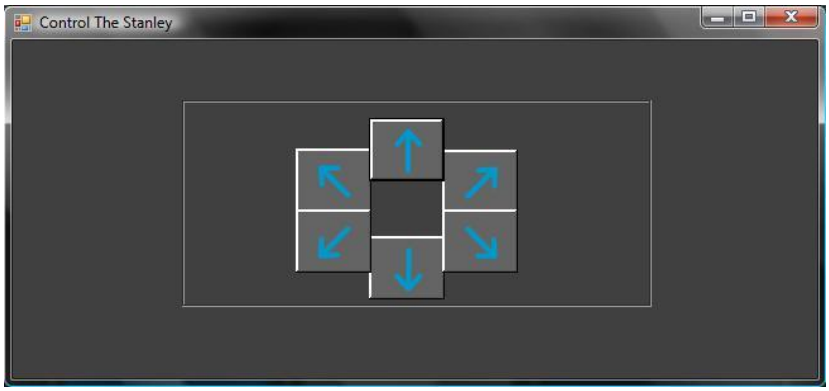
Select **any button** to get into more fun with the Stanley

NOTE* if you don't own the webcam, you can use only three parts of the application: Control the Car on Screen, Control Car with Mouse and Draw the Path.

Control the Car on the Screen

Requirements

- RC Car
- PhidgetInterfaceKit

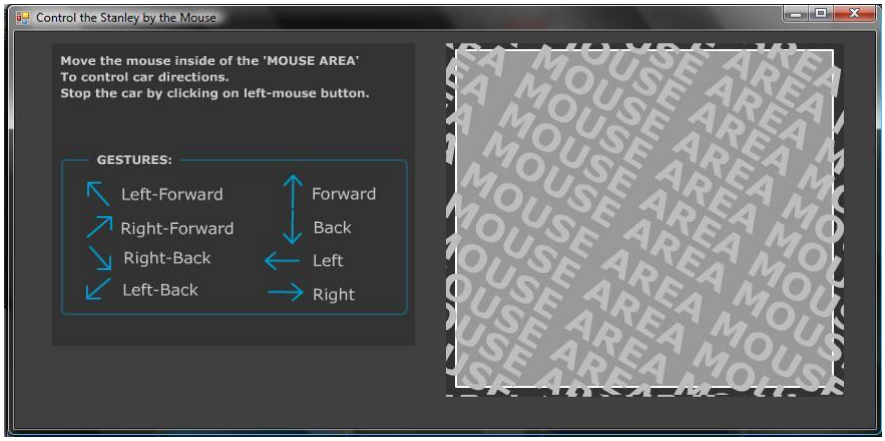


1. Click the **Arrows** button in what direction you want Stanley to move.
2. Hold the button as long you want Stanley to move
    a. Forward arrow = Move Forward
    b. Back arrow = Move Back
    c. Left – Up arrow = Move Forward-Left
    d. Right – Up arrow = Move Forward-Right
    e. Left – Down arrow = Move Back-Left
    f. Right – Down arrow = Move Back-Right

Control the Car on the Screen

Requirements

- RC Car
- PhidgetInterfaceKit



1. Place the mouse arrow inside of the “Mouse Area”
2. Press **Right mouse button** to **Enable** “Mouse Area”
3. **Move the mouse** in the direction you want Stanley to go
4. Press **Right mouse button** to **Disable** “Mouse Area”

DISABLE “Mouse Area” means that Application want capture any mouse movements.

ENABLE “Mouse Area” means that Application will capture mouse movements.

NOTE* Stanley will take direction only from the movements that are made inside of the mouse area, if mouse arrow is out of that area, Stanley will stop.

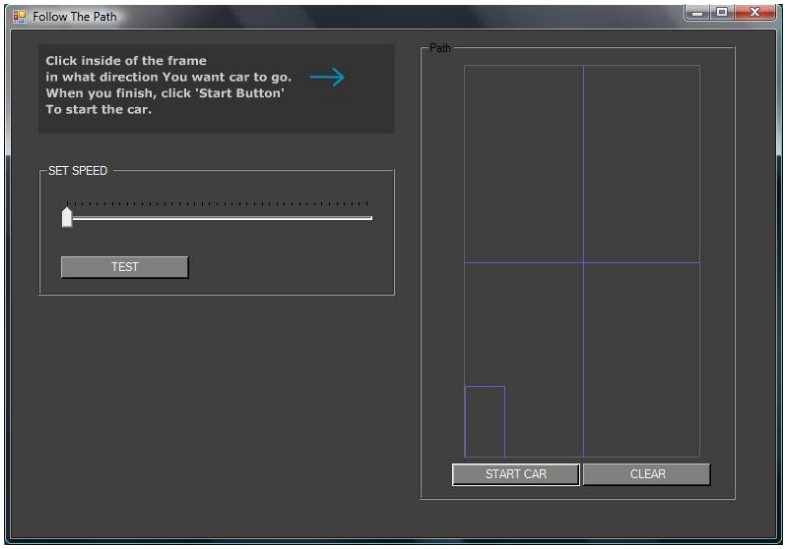
Follow the Path

Requirements

- RC Car
- PhidgetInterfaceKit

RC Car speed depends on the current battery charge.

To ensure that Car follows the path accurately it is important to set right speed for the car:



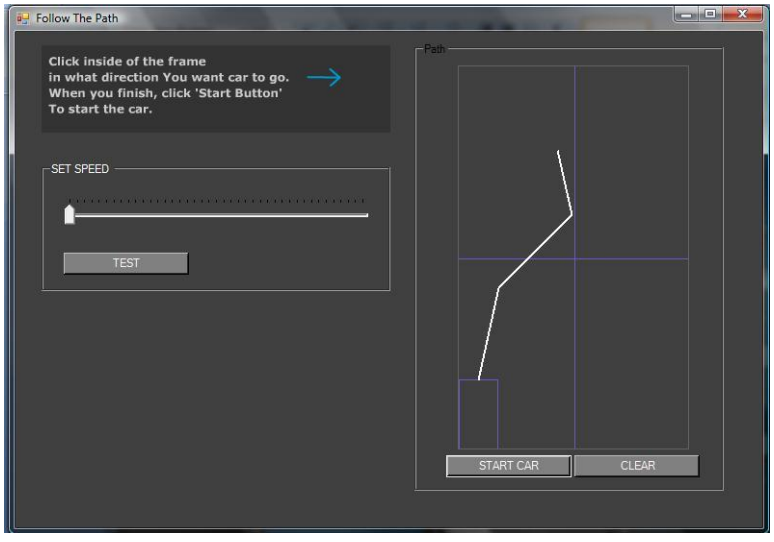
SET THE SPEED

1. Place Stanley on the starting position
2. Set the **Slider**
3. Press the **Test** button

If Stanley didn't reach the middle line, slider needs to be moved up, otherwise, slider need to be moved down.

Continue with adjusting the speed until you got Stanley to stop just in front of the line.

DRAW THE PATH

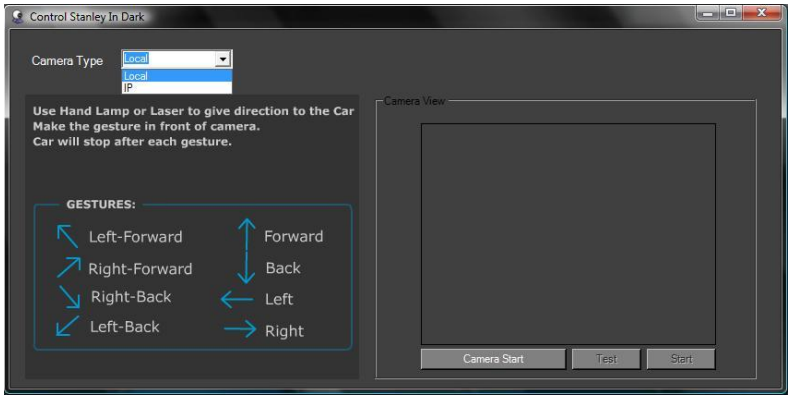


1. Place Stanley on starting position
2. **Click inside of the Drawing** area on the places where you would like Stanley to go.
3. As you click, application will connect the points, and path will be created
4. Press **Start** Button

Control in Dark

Requirements

- RC Car
- PhidgetInterfaceKit
- USB Webcam or IP Webcam
- Laser Pointer or Hand Lamp



1. Select the **Camera Type**

USB Webcam

1. Point the camera to the clear area where is note to much light
2. Press the **Test** button to test if camera capture any light that shouldn't be captured

NOTE* If there are red lines inside of **Camera View**, that means that camera see some light

3. Continue placing the camera until you find clear area
4. Press **Start** button
5. In camera field of view make following **Hand Gestures** to control Stanley

= Move Forward

= Move Back

= Move Forward-Left

= Move Forward-Right

= Move Back-Left

= Move Back-Right

6. Stanley will move in specific direction and then Stop
7. Make new gestures when Stanley Stops

IP Webcam

1. Select the IP address of the camera
2. Point the camera to the clear area where is note to much light
3. Press the **Test** button to test if camera capture any light that shouldn't be captured

NOTE* If there are **red lines** inside of **Camera View**, that means that camera see some light

4. Continue placing the camera until you find clear area
5. Press **Start** button
6. In camera field of view make following **Hand Gestures** to control Stanley

= Move Forward

= Move Back

= Move Forward-Left

= Move Forward-Right

= Move Back-Left

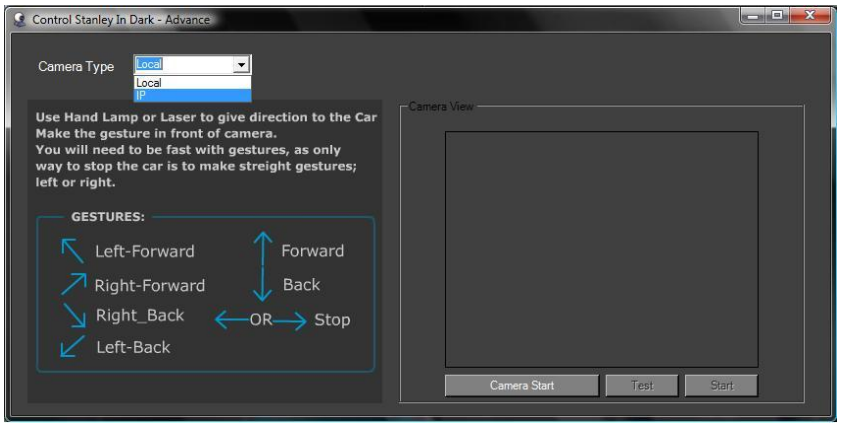
= Move Back-Right

8. Stanley will move in specific direction and then Stop
9. Make new gestures when Stanley Stops

Control in Dark Advance

Requirements

- RC Car
- PhidgetInterfaceKit
- USB Webcam or IP Webcam
- Laser Pointer or Hand Lamp



1. Select the **Camera Type**

USB Webcam

2. Point the camera to the clear area where is note to much light
3. Press the **Test** button to test if camera capture any light that shouldn't be captured

NOTE* If there are red lines inside of **Camera View**, that means that camera see some light

4. Continue placing the camera until you find clear area
5. Press **Start** button
6. In camera field of view make following **Hand Gestures** to control Stanley

= Move Forward

= Move Back

= Move Forward-Left

= Move Forward-Right

= Move Back-Left

= Move Back-Right

7. To **Stop** the Stanley make following gestures

Or

IP Webcam

1. Select the IP address of the camera
2. Point the camera to the clear area where is note to much light
3. Press the **Test** button to test if camera capture any light that shouldn't be captured

NOTE* If there are red lines inside of **Camera View**, that means that camera see some light

4. Continue placing the camera until you find clear area
5. Press **Start** button

6. In camera field of view make following **Hand Gestures** to control Stanley

= Move Forward

= Move Back

= Move Forward-Left

= Move Forward-Right

= Move Back-Left

= Move Back-Right

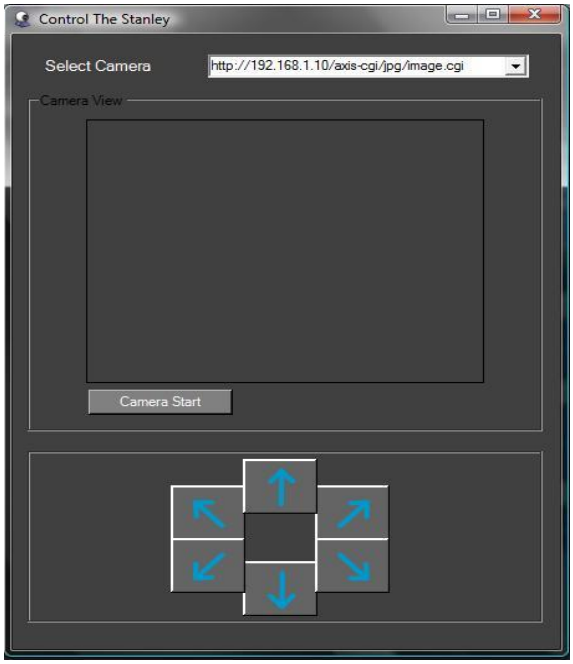
To Stop the Stanley make following gestures

Or

Control the Stanley with camera

Requirements

- RC Car
- PhidgetInterfaceKit
- IP Webcam

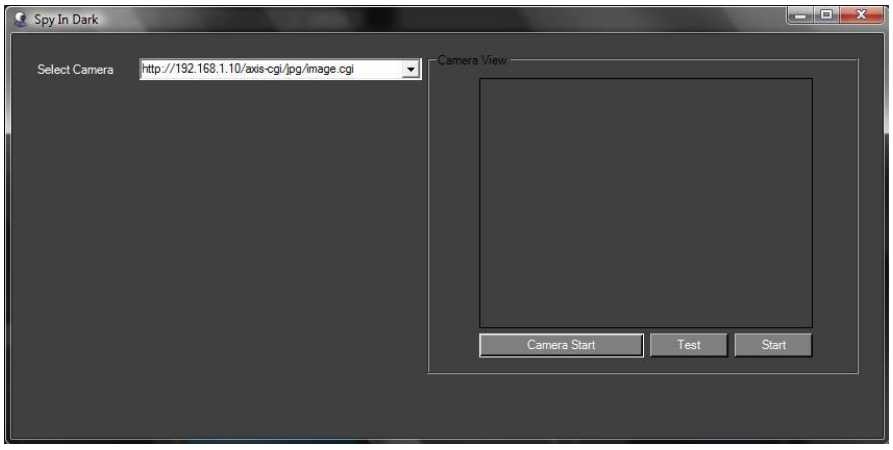


1. Select the IP address of Camera
2. Click the **Camera Start** button to open the camera
3. Click the **Arrows** button in what direction you want Stanley to move.
4. Hold the button as long you want Stanley to move
    a. Forward arrow = Move Forward
    b. Back arrow = Move Back
    c. Left – Up arrow = Move Forward-Left
    d. Right - Up arrow = Move Forward-Right
    e. Left – Down arrow = Move Back-Left
    f. Right - Down arrow = Move Back-Right

Spy in Dark

Requirements

- RC Car
- PhidgetInterfaceKit
- IP Webcam
- Laser Pointer or Hand Lamp



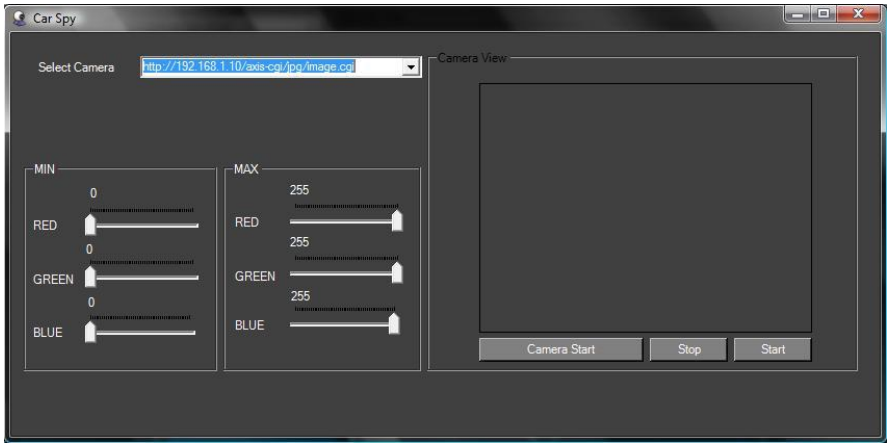
1. Place the Camera on the top of the Stanley, pointing forward
2. Select the IP address of Camera
3. Click the **Camera Start** button to open the camera
4. Turn on laser pointer or hand lamp
5. Start to move in front of the Stanley
6. Stanley will follow the light
7. Move out of the camera view to let Stanley to search for you

Car Spy

Requirements

- RC Car
- PhidgetInterfaceKit

- IP Webcam
- Object to follow



1. Place the Camera on the top of the Stanley, pointing forward
2. Select the IP address of Camera
3. Click the **Camera Start** button to open the camera
4. Place the object in camera field view
5. Move color bars until you get camera too see just your object

NOTE* Inside of the **Camera View** just your object should have rectangle around object.

6. Start to move in front of the Stanley
7. Stanley will follow the object
8. Move out of the camera view to let Stanley to search for you